



GUSTATORY ALTERATION SEEN IN PATIENTS OF CHRONIC SUPPURATIVE OTITIS MEDIA BEFORE AND AFTER SURGERY IN NORTH INDIAN POPULATION- A PROSPECTIVE STUDY

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ABSTRACT

Introduction:- The chorda tympani nerve has got vital function in taste sensation. The gustatory alteration due to manipulation of chorda tympani nerve was common after middle ear surgery, but rarely seen due to disease itself. Few studies have reported this alteration in patients with chronic suppurative otitis media (CSOM), prior to surgical treatment. **Aims and Objectives:-** To assess gustatory alteration due to chorda tympani nerve involvement in all patients of CSOM in Varanasi district population, before and after surgical intervention. **Material and Methods:-** This prospective study was carried out in the Department of ENT, Institute of Medical Sciences, BHU, Varanasi between August 2019 to July 2021. 150 patients who fulfilled the inclusion criteria were selected for the study. All the selected patients were analysed and clinically assessed before and after surgery for gustatory alteration, with tests based on "taste strips" with different concentrations of salt, sweet, bitter and sour. Intra-operative finding of chorda tympani nerve was documented in all operated cases. The CTN (chorda tympani nerve) was assessed both pre and post-operatively by history and questionnaire, Qualitative tests, symptom questionnaire, Solution of different concentrations, surgeon's form and Quality of Life questionnaire. Statistical analysis was done using SPSS software (Statistical Package for the Social Science), having version 16 and test of significance was 95%. **Results:-** 36 patients in which Chorda was manipulated intraoperatively, produced symptoms but 33 patients (91.67%) recovered well and 17 patients in which chorda was sacrificed, produced symptoms but 16 patients (94.12%) recovered well. This concluded that more than 90% patients got recovered in gustatory alteration within 6 months of surgery, irrespective of whether, chorda nerve was manipulated or sacrificed. **Conclusions:** During surgery if it is needed to compromise the chorda tympani nerve to make a disease free ear, it is better to cut the nerve with a scissor, then manipulating or stretching it. Maximum patients got recovered from gustatory alteration within 6 month of chorda nerve injury.

KEYWORDS : Chorda, Gustatory sensation, Manipulation, Otitis Media

INTRODUCTION

The tympanic cavity is connected to the rest of the upper airway through the eustachian tube, which plays an important role in ventilation and drainage of the middle ear and thereby in middle ear pathology. [1] The tympanic cavity contains three ossicles: the malleus, incus and stapes. The handle of the malleus is attached to the superior part of the pars tensa of the tympanic membrane. The incus forms a bridge between the malleus and the stapes and the footplate of the stapes connects to the inner ear via the oval window. [2] The middle ear also contains the chorda tympani nerve, which runs between the handle of the malleus and the long process of the incus. The chorda tympani nerve branches from the facial nerve just before entering the tympanic cavity and leave the cavity through the petrotympanic fissure to join the lingual nerve. [3]

Intra-operative damage to chorda tympani nerve is a recognized complication during middle ear surgery. Three areas have been recognized where chorda tympani nerve is commonly encountered during middle ear surgery. [4] The most frequently manipulated area is the portion running just behind the annulus in the posterior-superior quadrant. When the tympanomeatal flap is elevated and the bony annulus is removed by drilling or curette to see the incudostapedial joint, the chorda tympani nerve gets damaged by touching, traction, or stretching. The second most frequently manipulated area was the portion anterior to the malleus neck. When calcification is removed with a fine pick or when the anterior tympanic scutum is cut using a chisel, injury to the chorda tympani nerve may occur without being apparent. The third most frequently touched area is the bifurcation from the

descending portion of the facial nerve. As this portion runs through the bony canal, chorda tympani nerve is sometimes injured by drilling the opening of the facial recess during canal wall up procedure or cochlear implant surgery. Felix F et al [5] identified gustatory alterations due to chorda tympani nerve involvement in patients with COM without prior surgery. Just T, et al [6] assessed taste disorders and recovery of the taste function after middle ear surgery. They found that the scale of chorda manipulation is important for the recovery of the taste function after middle ear surgery. Galindo J et al [7] studied the clinical outcomes of the nerve's section versus its conservation in otosclerosis surgery. The results suggest there are no major clinical differences following section versus conservation of the chorda tympani nerve.

In this study, the gustatory alteration pre-operatively due to disease itself and post-operatively due to intra-operative manipulation of the nerve in patients of CSOM in Varanasi district region were evaluated. Also, the evaluation of maximum time required for recovery of gustatory alteration in all our patients for different taste sensations were done.

Materials and Methods

This prospective study was carried out in the Department of ENT, Institute of Medical Sciences, BHU, Varanasi between August 2019 to July 2021. The Ethical clearance was taken from the institute ethical committee (notification no 2020/EC/2058). 150 patients fulfilling the inclusion criteria were included in the study after taking informed consent.

Inclusion Criteria

Patients from both genders, regardless of race, with unilateral

tubotympanic or attico-antral chronic suppurative otitis media – clinically and radiologically confirmed, with a healthy contralateral ear.[8]

Exclusion Criteria

The following patients were excluded from our study:-

- Patients previously underwent for ear surgery on any side
- Patients with prior history of facial paralysis
- Patients with active tongue disease
- Patients with neurological disorders which may impair cognition or communication
- Patients using any medications, which can alter the taste

All the selected patients were analysed and clinically assessed before and after surgery for gustatory alteration, with tests based on "taste strips" with different concentrations of salt, sweet, bitter and sour. Intra-operative finding of chorda tympani nerve was also documented in all operated cases. All patients were diagnosed on the basis of clinical history, otoscopic findings and radiological scan of temporal bone.

Solutions Used

Different concentration of Salt (sodium chloride- 0.5%, 2.5%, 5%, 10%, 25%), Sweet (sucrose- 0.5%, 2.5%, 10%, 20%, 50%), Sour (citric acid- 0.1%, 1%, 2%, 5%, 10%) and Bitter (kinin hydrochloride- 0.05%, 0.25%, 0.5%, 1%, 2.5%) were used.

Intra-operative Findings Of Chorda Tympani Nerve (CTN)

- Presence/absence of CTN
- Normal/Atrophy/Dislocation/Adherence
- Extent of surgical trauma- CTN untouched, touched and stretched only
- Visually injured (sacrificed) and shrunk because of desiccation

Types Of Surgeries Performed In This Study

1. CWDTM (Canal wall down tympanomastoidectomy)
 2. CWDTM with Myringostapedioplasty (Canal wall down tympanomastoidectomy with Myringostapedioplasty)
 3. CWDTM with OP (Canal wall down tympanomastoidectomy with ossiculoplasty)
 4. TP (Tympanoplasty)
 5. TP with CM (Tympanoplasty with Cortical mastoidectomy)
 6. TP with CM with CP (Tympanoplasty with Cortical mastoidectomy with Canaloplasty)
 7. TP with CM with PA (Tympanoplasty with Cortical mastoidectomy with Posterior atticotomy)
 8. TP with OP with CP with PA (Tympanoplasty with ossiculoplasty with Canaloplasty with Posterior atticotomy)
 9. TP with PA (Tympanoplasty with Posterior atticotomy)
 10. TP with CP (Tympanoplasty with Canaloplasty)
 11. TP with OP with PA (Tympanoplasty with ossiculoplasty with Posterior atticotomy)
 12. TP with OP (Tympanoplasty with ossiculoplasty)
- Tympanoplasty was done for tubotympanic type of cases, whereas canal wall-up and canal wall down were done for attico-antral cases.

Histopathological Examination:- Intra-operative tissue was sent for histopathological examination in all attico-antral cases, having granulations or cholesteatoma (Granulations in middle ear or mastoid cavity).

Chorda Tympani Nerve (CTN) Assessment:-The CTN was assessed both pre and post-operatively by history and questionnaire, Qualitative tests, symptom questionnaire, Solution of different concentrations, surgeon's form and Quality of Life questionnaire

- **History And Questionnaire:-** The patient answered a questionnaire with personal information about his/her past ear disease, the duration of this middle ear chronic

disease, the presence of systemic disease, smoking and use of medication. Taste questionnaire had the advantage of enabling systemic evaluation of the patient, requiring limited clinical time. [9-12]. Taste questionnaires were performed, both pre-operatively and post operatively [post operative day 10, at 1 month, at 3 months, and at 6 month]. We assessed by asking the taste of some common foods (salty, sour, bitter and sweets) for perceived intensity of these food, dysgeusia and food hedonics. This assessment is valid and reliable as these were done by test-retest procedure.

• Qualitative Tests [Filter Paper Disc (FPD) Method]-:[13]

The FPD method measures the ability to recognize the four flavors of sweet, salty, sour and bitter. Circular FPDs with a diameter of 5 mm were soaked in solutions of one of the four flavors, each in five different concentrations. Salt (sodium chloride) 0.5%, 2.5%, 5%, 10%, 25%, Sweet (sucrose) 0.5%, 2.5%, 10%, 20%, 50%, Sour (citric acid) 0.1%, 1%, 2%, 5%, 10% and Bitter (kinin hydrochloride) 0.05%, 0.25%, 0.5%, 1%, 2.5%. The FPD was then placed on the lateral side of the tongue, about 2 cm from its tip. The lowest concentration level was applied first, followed by the next higher level, until the participant indicated his/her perception of the correct flavor. The threshold level was established for each of the flavors. A scoring system ranging from 1 to 6 was used, in which 1 represented the lowest threshold, 5 the highest measurable threshold, and 6 an immeasurably high threshold, meaning that no flavor was perceived even at the highest concentration. The scores for all four flavors were summed to create a total score for each side. The total scores could vary from 4 to 24, in which a score of 4 was equivalent to maximum taste ability and a score of 24 was equivalent to no ability to perceive flavors. [14]

• Symptom Questionnaire:-

A symptom questionnaire was used in the studies. One version was used for evaluation of preoperative symptoms and another for postoperative symptoms. Boxes were ticked to indicate taste disturbances and the degree of the disturbance was indicated on a visual analog scale (VAS) from 1 (no disturbance) to 100 (maximum disturbance). [15] The participant was asked to indicate disturbances such as changes in perceived intensity (stronger, weaker or absence of taste), detection of unpleasant and/or lingering tastes (e.g. metallic taste), dysgeusia or changes in food hedonics and space was provided for the patients to describe the disturbance(s) in his/her own words. [9-12]

• Solution Of Different Concentrations: [14]

• Surgeon's Form- [14]

The surgeon's form includes the surgeon's description of the status of the CTN immediately upon elevation of the tympanomeatal flap. The surgeon ticked boxes to indicate the presence or absence of CTN atrophy, dislocation, and adherence. The surgeon also ticked boxes to indicate the extent of surgical trauma- CTN untouched, touched and stretched only, visually injured, severed, or shrunk because of desiccation under the light beam of the operating microscope. [ANNEXURE-3]

• Quality Of Life (QOL) Questionnaire:-

A QoL questionnaire about general health- the participants completed the questionnaire pre-operatively and at 6 months post-operatively. [16]

Statistical Analysis

In this study, statistical analysis was done using SPSS software (Statistical Package for the Social Science), having version 16 and test of significance was 95%.

RESULTS

150 patients (80 male and 70 females), who fulfilled the

inclusion criteria were selected for the study. All the patients were analysed, pre operatively assessed, managed surgically and intra-operative finding were noted.

In this study, majority of the patients belonged to 31-40 years age-group and the least number of patients were in age-group 51-60. The patients in our study belonged to age range of 14-66 years. The mean age of the patients in our study was 31.53 ± 12.35 and the median age was 24 years.

Table/Figure 1- Distribution Of Cases According To Laterality Of Disease

Diagnosis	Number	Percentage
LT CSOM	79	52.7
RT CSOM	71	47.3
Total	150	100

Patients, who were included had 79 cases of left CSOM (52.7%), than right CSOM 71(47.3%) in unilateral disease.

Table/Figure 2:- Type Of CSOM

Type of CSOM	Number	Percentage
Tubo-tympanic	129	86
Attico-antral	21	14

Out of 150 patients, 86% had tubotympanic type of disease, while 14% had atticofacial type of disease.

Table/Figure 3:- Chorda Tympani Nerve Status In Various Surgical Procedures

Type of surgery	frequency	Nerve manipulated	Nerve sacrificed	Nerve ab-sent	Nerve not injured
CWDTM	13 (8.67%)	3 (23.08%)	6 (46.15%)	1 (7.7%)	3 (23.08%)
CWDTM with Myringo-staped-opexy	1 (0.67%)	0	1 (100%)	0	0
CWDTM with OP	7 (4.67%)	2 (28.57%)	3 (42.86%)	0	2 (28.57%)
TP	101 (67.33%)	26 (25.74%)	8 (7.9%)	0	67 (66.34%)
TP with CM	13 (8.67%)	1 (7.7%)	1 (7.7%)	0	11 (84.62%)
TP with CM with CP	1(0.67%)	0	0	0	1 (100%)
TP with CM with PA	2 (1.33%)	1 (50%)	0	0	1 (50%)
TP with OP with CP with PA	1 (0.67%)	1 (100%)	0	0	0
TP with CP	1 (0.67%)	0	0	0	1 (100%)
TP with OP with PA	2 (1.33%)	0	1 (50%)	0	1 (50%)
TP with OP	5 (3.33%)	1 (20%)	1 (20%)	0	3 (60%)
TP with PA	3 (2%)	2 (67.7%)	0	0	1 (33.3%)
Total	150	37 (24.67%)	21 (14%)	1 (0.67%)	91 (60.67%)

(CWDTM- canal wall down tympano mastoidectomy, OP- ossiculoplasty, TP- Tympanoplasty, CM-cortical mastoidectomy, CP- canaloplasty, PA- posterior atticotomy.)

Out of 150 subjects, chorda was not injured in 91 (60.6%), while in 58 (38.67%), Chorda got injured, out of which, chorda was just manipulated in 37 (24.7%) and in 21 (14%), chorda was sacrificed. In 1 patient (0.67%), chorda was found absent intra-operatively.

150 patients got operated, out of which, 142 patients (94.7%) had healthy middle ear and mastoid cavity intra-operatively, while 8 patients (5.3%) had unhealthy middle ear or mastoid cavity and tissue was sent for histopathological examination. Out of these 8 patients, 7 patients histopathological report was suggestive of non-specific granulation tissue, while 1 patient was diagnosed with tubercular granuloma.

Table/Figure 4:- Gustatory Findings On Follow-up

Taste	Days	Not altered (score=4)		Reduced (score 5-24)		Improved (score=4)	
		N	%	N	%	N	%
SALT	0	147	98.00	3	2.00	0	0.00
	10	101	67.33	49	32.67	0	0.00
	30	101	67.33	16	10.67	33	22.00
	90	134	89.33	7	4.67	9	6
	180	143	95.33	4	2.67	3	2
SWEET	0	145	96.67	5	3.33	0	0
	10	94	62.67	56	37.33	0	0
	30	92	61.33	20	13.33	38	25.33
	90	130	86.67	10	6.67	10	6.67
	180	140	93.33	5	3.33	5	3.33
BITTER	0	142	94.67	8	5.33	0	0
	10	89	59.33	61	40.67	0	0
	30	89	59.33	14	9.33	47	31.33
	90	136	90.67	6	4	8	5.33
	180	144	96	3	2	3	2
SOUR	0	146	97.33	4	2.67	0	0
	10	109	72.67	41	27.33	0	0
	30	101	67.33	18	12	31	20.67
	90	132	88	10	6.67	8	5.33
	180	140	93.33	6	4	4	2.67

Day 0- Pre-operative evaluation
 Day 10- At first follow-up post operatively
 Day 30- At second follow-up
 Day 90- At third follow-up
 Day 180- At fourth follow-up

- In not altered and improved group, all patients responded to minimal concentration (0.5% salt, 0.5% sweet, 0.1% sour and 0.05% bitter).

Table/Figure 5- Reduced Gustatory Function According To Different Concentrations Of Salt Solution

Day	Total	2.5%	5%	10%	25%
0	3	1	1	1	0
10	49	24	13	11	1
30	16	8	5	2	1
90	7	3	2	1	1
180	4	1	1	1	1

On pre-operative evaluation, 3 patients had gustatory alteration for salt at concentrations of 2.5%, 5% and 10% respectively (1 patient for each concentration).

At day 10, total 49 patients had gustatory alteration, with 24 patients at 2.5%, 13 patients at 5%, 11 patients at 10% and 1 patient at 25%. At day 30, 16 patients had gustatory changes, with 8 patients at 2.5%, 5 patients at 5%, 2 patients at 10% and 1 patient at 25%. At day 90, total 7 patients had gustatory changes, with 3 patients at 2.5%, 2 patients at 5%, 1 patient at 10% and 1 patient at 25%. At day 180, total 4 patients were having gustatory changes, with 1 patient at 2.5%, 1 patient at 5%, 1 patient at 10% and 1 patient at 25%.

Table/Figure 6- Reduced Gustatory Function According To Different Concentrations Of Sweet Solution

Day	Total	2.5%	10%	20%	50%
0	5	3	1	0	1
10	56	30	18	6	2
30	20	13	4	2	1
90	10	6	2	1	1
180	5	3	0	1	1

On pre operative evaluation, 5 patients were having gustatory alteration for sweet, with 3 patients at concentration of 2.5%, 1 patient at 10% and 1 patient at 50%.

At day 10, total 56 patients had gustatory alteration, with 30 patients at 2.5%, 18 patients at 10%, 6 patients at 20% and 2 patients at 50%. At day 30, 20 patients were having gustatory changes, with 13 patients at 2.5%, 4 patients at 10%, 2 patients at 20% and 1 patient at 50%. At day 90, total 10 patients were having gustatory changes, with 6 patients at 2.5%, 2 patients at 10%, 1 patient at 20% and 1 patient at 50%. At day 180, total 5 patients were having gustatory changes, with 3 patients at 2.5%, 1 patient at 20% and 1 patient at 50%.

Table/Figure 7- Reduced Gustatory Function According To Different Concentrations Of Bitter Solution

Day	Total	0.25%	0.5%	1%	2.5%
0	8	4	2	1	1
10	61	34	17	9	1
30	14	8	3	2	1
90	6	4	1	0	1
180	3	2	1	0	0

On pre-operative evaluation, 8 patients were having gustatory alteration for bitter, with 4 patients at concentration of 0.25%, 2 patients at 0.5%, 1 patient at 1% and 1 patient at 2.5%.

At day 10, total 61 patients were having gustatory alteration, with 34 patients at 0.25%, 17 patients at 0.5%, 9 patients at 1% and 1 patient at 2.5%.

At day 30, 14 patients were having gustatory changes, with 8 patients at 0.25%, 3 patients at 0.5%, 2 patients at 1% and 1 patient at 2.5%.

At day 90, total 6 patients were having gustatory changes, with 4 patients at 0.25%, 1 patient at 0.5%, and 1 at 2.5%.

At day 180, total 3 patients were having gustatory changes, with 2 patients at 0.25% and 1 patient at 0.5%.

Table/Figure 8- Reduced Gustatory Function According To Different Concentrations Of Sour Solution

Day	Total	1%	2%	5%	10%
0	4	2	1	1	0
10	41	26	8	6	1
30	18	9	6	3	0
90	10	4	4	2	0
180	6	3	2	1	0

On pre-operative evaluation, 4 patients were having gustatory alteration for sour, with 2 patients at concentration of 1%, 1 patient at 2% and 1 patient at 5%.

At day 10, total 41 patients were having gustatory alteration, with 26 patients at 1%, 8 patients at 2%, 6 patients at 5% and 1 patient at 10%. At day 30, 18 patients were having gustatory changes, with 9 patients at 1%, 6 patients at 2% and 3 patients at 5%. At day 90, total 10 patients were having gustatory changes, with 4 patients at 1%, 4 patients at 2% and 2 patients at 5%. At day 180, total 6 patients were having gustatory changes, with 3 patients at 1%, 2 patients at 2% and 1 patient at 5%.

Pre-operative Evaluation:- In this, the taste alteration was

present due to disease itself.

Table/Figure 9- Pre-operative Evaluation For CTN:-

Patients	Salt	Sweet	Bitter	Sour
150	3	5	8	4

After 6 month of surgery, 1 patient (chorda manipulated) had alteration for sweet and 2 patients (chorda sacrificed in 1) had alteration for bitter taste; rest all patients were recovered fully.

Table/Figure 10- Table Showing Symptomatic Patients After Ctn Manipulation Or Sacrifice

Intra-operative CTN	Total	Symptomatic	No symptoms
Manipulated	37	36(97.3%)	01(2.7%)
Sacrificed	21	17(80.95%)	04(19.05%)

Thus, manipulation of chorda nerve produced more symptoms as compared to sacrifice of the nerve.

Table/Figure 11- Post-op Recovery Of Ctn Symptoms After 6 Months Of Surgery

Intra-operative CTN	Total symptomatic	Recovered	Not recovered
Manipulated	36	33(91.67%)	3(8.33%)
Sacrificed	17	16(94.12%)	1(5.88%)

Thus, maximum patients (90- 95%) got recovered from gustatory alteration within 6 months of surgery, irrespective of whether, chorda nerve was manipulated or sacrificed.

DISCUSSION

The various middle ear surgeries include myringoplasty, mastoidectomy, stapedectomy, tympanoplasty, tympanotomy, ossiculoplasty, etc. All these surgeries share the same surgical access to middle ear i.e. elevation of tympanomeatal flap [17]. While elevating the flap, the chorda tympani nerve which lies immediately medial to the tympanic membrane, is seen running forward from posterior canaliculus in between the handle of malleus and incus. The chorda tympani nerve, a branch of the facial nerve, is the most important taste nerve. Functionally, the chorda tympani nerve has two components: preganglionic secretomotor fibers to the submandibular and sublingual salivary glands and fibers carrying taste sensation to the anterior two-thirds of the tongue while the nerve runs uncovered through the space of the middle ear [3]. This location can expose the nerve to bacterial toxins, enzymes, and mechanical damage related to inflammatory middle ear pathologies such as chronic suppurative otitis media, with or without cholesteatoma. Injury of the chorda tympani nerve is a common risk associated with middle ear surgeries. The nerve is almost always touched and stretched to some degree by the instruments, desiccated under the light of the operating microscope, or even severed (Gopalan P, et al)[18].

Table/Figure 12:- Table Comparing Various Similar Studies From Literature With The Present Study

S. No.	Author's Name and year	Place of Study	Sam ple Size	Parameter compared	Conclusion
1	Priya-darshini et al (2017) [19]	Aarupadai Veedu Medical College and Hospital, Pondicherry, India	180	Commonest age group in tubotympanic CSOM	31-40 years
2	Felippe Felix et al (2009) [5]	Federal University of Rio de Janeiro - Hospital Universitário Clementino Fraga Filho da UFRJ	45	Gustatory alteration without surgery	Gustatory alteration present even without complaint

3	Ravindran V et al , 2021 [20]	Yenepoya Medical College, Mangalore, Karnataka, India	100	Pre operative and post operative gustatory alteration	Patients recovered symptoms after surgery					
4	Michael P et al (2007) [21]	From New Cross Hospital, Wolverhampton, West Midlands, United Kingdom.	140	operative findings of chorda tympani nerve trauma correlate with postoperative symptoms	chorda tympani nerve transection results in fewer symptoms than chorda tympani nerve stretching					before and 4 days after the surgery on both sides of the anterior part of the tongue for taste sensation
5	Rehman et al 2013 [22].	Sher-i-Kashmir Institute of Medical Sciences Medical College, Bemina, Srinagar, Jammu and Kashmir, India	178	prevalence of chorda tympani nerve injury and related symptoms following varying degrees of trauma to the nerve	stretching of the nerve produced more symptomatic cases than thermal injury or drying					depending on the amount of manipulation of the chorda tympani nerve, taste function decreased after the surgery
6	Just T, et al (2003) [6]	University of Rostock, Germany	118	Taste disorders and recovery of the taste function after middle ear surgery	chorda tympani nerve should be preserved intra operatively, especially when an operation of the contralateral ear is planned as well					Majority of patients belong to age group of 31-40 years. Pre operative taste changes due to disease itself and post operative gustatory alteration depends upon degree of trauma to nerve, stretching of nerve causes more symptoms then cutting with sharp scissor. Majority of patients recovers in 6 month of follow up.
7	Kiverniti, E et al (2012) [23]	Southend University Hospital, Essex, UK	57	immediate and long-term taste effects of chorda tympani nerve sacrifice in patients undergoing open cavity mastoidectomy	Most post-operative taste disturbance resolves, and most patients are not aware of long-term disturbance					
8	Huang et al. [24]	China Medical University Hospital, Taiwan	38	evaluate taste function and Intra-operative assessments of the chorda tympani nerve were also compared and analyzed	intraoperative injury to the chorda tympani nerve, postoperative taste decline is only temporary					
9	Mueller et al. [25]	Medical University Vienna, Vienna, Austria	47							
	Present study	Institute of Medical Sciences, Banaras Hindu University, Varanasi, India	150							

In present study, the most commonly involved age-group was 31 to 40 years with male predominance seen (80 males and 70 females). In the study by Priyadarshini et al [19], the commonest age-group for tubo-tympanic CSOM was 31 – 40 years, similar to present study. There was gustatory alteration even without surgery (pre-operative evaluation) due to disease itself in present study. Felipe Felix et al [5] also concluded that gustatory alteration can be present in non-surgical cases even without any complaint. Some patients, who had transection of nerve intra-operatively, produced less symptoms as compared to the manipulated group in present study.

Michael P et al [21] co-related intra-operative findings to post-operative symptoms and showed that chorda tympani nerve transection results in fewer symptoms than chorda tympani nerve stretching. Mueller et al [26] assessed pre-operative status with 4th day of surgery and showed that, depending on the amount of manipulation of the chorda tympani nerve, taste function decreased after the surgery. Those patients having symptoms pre-operatively were mostly got improved after the surgery.

Ravindran V et al [20], performed pre-operative and post-operative assessment and showed that patients got recovered

from symptoms after surgery (Total 100 patients were involved in study, 14 patients were found to have taste changes pre-operatively, of which nine patients recovered their taste 1 week following surgery, and the remaining five patients recovered at 1 month following surgery. Thus, the recovery was significant, and they concluded that chronic inflammation of the middle ear itself can cause gustatory alterations, and these changes are expected to recover once the disease is cleared). In present study, patients who developed symptoms after injury to chorda nerve, (91.67% in manipulated group and 94.12% in sacrificed group) mostly got recovered within a follow-up of six months. {Explained in table/Figure 11}.

Kiverniti, E et al [23] performed immediate and long term evaluation of taste effects of chorda tympani nerve, sacrificed in mastoidectomy patients and showed that most of the post-operative taste disturbances got resolved, and most patients were not aware of long-term taste disturbances. Huang et al. [24] showed that in intra-operative injury to the chorda tympani nerve, the post-operative taste decline is only temporary.

In present study, same subject was evaluated both pre-operatively and post-operatively. Assessment was done widely at all concentrations of different solution.

Limitation

1. Test performed for gustatory alteration in this study were subjective tests. So, bias in responses cannot be avoided.
2. This is not a comparative study, so randomized controlled trial for gustatory alteration could not be performed.

CONCLUSION

- The gustatory alteration can be due to chronic suppurative otitis media disease itself or due to trauma during the course of surgery.
- The gustatory alteration due to disease can get recovered after surgery but in those patients with surgical trauma, majority of them recovers within a duration of six months.
- Intra-operative stretching of nerve causes more symptoms, then cutting with sharp scissors.
- Take home message is that intra-operatively chorda tympani nerve should be handle carefully. If needed, then cut the nerve by sharp scissors, instead of stretching it.

ANNEXURE-1

1. Changes in perceived intensity (stronger, weaker or absence of taste)
2. Detection of unpleasant and/or lingering tastes (e.g. metallic taste)
3. Dysgeusia
4. Changes in food hedonics

ANNEXURE-2

1. Salt (sodium chloride) 0.5%, 2.5%, 5%, 10%, 25%
2. Sweet (sucrose) 0.5%, 2.5%, 10%, 20%, 50%
3. Sour (citric acid) 0.1%, 1%, 2%, 5%, 10%
4. Bitter (kinin hydrochloride) 0.05%, 0.25%, 0.5%, 1%, 2.5%.

ANNEXURE-3

1. Presence/absence of CTN- 149/1.
2. Normal/Atrophy/Dislocation/Adherence- 135/3/2/9.
3. Extent of surgical trauma- CTN untouched, touched and stretched only- 91/10/27.
4. Visually injured (sacrificed)-21.
5. Shrunken because of desiccation-9.

ANNEXURE-4

Item Scaling (Andrews and Crandall)

1. Delighted-14
2. Pleased-68
3. Mostly satisfied-49
4. Mixed-11

5. Mostly dissatisfied-7
6. Unhappy-1
7. Terrible-0.

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